

Air supply device for a vehicle seat

5 The invention relates to an air supply device for a vehicle seat according to the preamble of patent claim 1.

10 Such an air supply device with an air channel arranged on the pressure side of a blower, which channel comprises an air discharge opening in the upper region of the seat for supplying the head, shoulder and neck area of an occupant of the seat with an adjustable airflow, is already known from DE 100 54 010 C1. In this connection, a heating element is provided inside the air channel between the blower and the air  
15 discharge opening.

It is an object of the invention to provide an air supply device of the kind mentioned in the introduction, the airflow of which is overall more  
20 homogeneous and better adjustable.

According to the invention, this object is achieved by an air supply device with the features of patent claim 1. Advantageous embodiments with expedient  
25 developments of the invention are indicated in the subclaims.

In the air supply device according to the invention, a grid element, by which turbulence of the airflow which has arisen inside the heating element is moderated, or the airflow is homogenized after flowing through the heating element, is arranged inside the air channel between the air discharge opening and the heating element. This results in an airflow which emerges more  
30 uniformly and at a slightly lower rate from the air discharge opening of the air supply device and which overall feels very comfortable to the occupant of the seat. Moreover, the grid element has the effect that an  
35

air build-up develops - seen in flow direction - between the blower and the grid element, as a result of which the heating element can transfer more heat to the airflow. By virtue of this, higher outlet temperatures  
5 can be achieved at the air discharge opening. Lastly, the grid element also serves as a protection against dirt particles, which could in particular penetrate as far as the heating element via the air discharge opening and the air channel.

10

A particularly good homogenizing effect of the grid element has been achieved when it is arranged transversely and in particular at right angles to the flow direction of the airflow.

15

It has moreover been found to be advantageous if the grid element covers the entire cross section of the air channel. By virtue of this, on the one hand particularly good protection against dirt particles is  
20 afforded, and on the other hand a particularly well homogenized airflow is achieved.

By means of a grid element arranged inside the air channel close to the air discharge opening, it is also  
25 possible to achieve the result that the airflow emerges particularly homogeneously at the air discharge opening in the direction of the occupant of the seat.

It has furthermore been found to be especially  
30 advantageous if the plurality of flowthrough openings of the grid element can be varied in their clear cross section. By virtue of this, both the homogeneity of the airflow and its rate can be influenced. The clear cross section of the flowthrough openings of the grid element  
35 can be varied especially easily by using two grids which are arranged next to one another and displaceable in relation to one another. In this connection, the two grids preferably have the same mesh sizes. If in this

connection the meshes of each grid overlap, the clear cross section of the flowthrough openings is at its greatest. If on the other hand the two grids are displaced in relation to one another by half a mesh width in the vertical and the horizontal direction, the smallest clear cross section of the flowthrough openings is obtained.

Further advantages, features and details of the invention emerge from the following description of two preferred illustrative embodiments and also with reference to the drawings, in which

Figs 1a, b show a diagrammatic, perspective front view and a diagrammatic side view of the backrest of a vehicle seat with the integrated air supply device according to the invention;

Fig. 2 shows a rear view of the air supply device according to Figures 1a, b, of which a blower can be seen in the lower region and the air supply channel with the air discharge opening arranged at the upper end can be seen above the blower;

Figs 3a, b show a perspective view and a front view of the upper end of the air channel with the air discharge opening according to Figure 2, a grid element being provided according to the invention close to the air outlet opening, and

Figs 4a, b show a front view of the grid element according to a further embodiment of the invention, in which two grids which are

parallel to one another and displaceable  
in relation to one another are provided.

In Figures 1a and 1b, the backrest 10 of a vehicle seat  
5 is indicated in a diagrammatic perspective front view  
and a diagrammatic side view respectively. Only a rear  
covering part 12 and a head restraint 14 of the  
backrest 10 are visible in Figure 1a. In this case, the  
vehicle seat is designed as an integral seat, the head  
10 restraint 14 being arranged in front of the backrest  
10, overlapping it. The head restraint 14 is height-  
adjustable in relation to the backrest 10 via guide  
means (not shown). An air supply device 16, which  
comprises as fundamental components a diagrammatically  
15 indicated blower 18 at the lower end of the air supply  
device and an air channel 20 arranged above the blower  
18, is attached to the rear covering part 12 of the  
backrest 10. A heating element 22, indicated only in  
dashed lines in Figure 1a, with which the airflow  
20 generated by the blower 18 can be heated, is provided  
inside the air channel 20 at a distance above and on  
the pressure side of the blower 18. At the upper end,  
the air channel 20 extending upright is angled toward  
the front in an L shape and ends in an air discharge  
25 opening 24. In this connection, the air channel 20 ends  
in the region of the air discharge opening 24 in a  
plane with the front side 26 of the head restraint 14.  
A grid element 32, which will be explained in greater  
detail below with reference to Figures 3a and 3b and 4a  
30 and 4b, is indicated inside the air channel 20 close to  
the air discharge opening 24. Moreover, in Figure 1b, a  
side cheek 28 of the backrest 10 is also visible, as is  
- indicated in dashed lines - the course of the  
upholstery cover 30 in the central surface region of  
35 the backrest 10. This also makes it possible to see  
that the air supply device 16 is arranged completely  
inside the backrest 10 and only the air discharge  
opening 24 is visible from outside.

Figure 2 shows the air supply device 16 according to Figures 1a and 1b in a rear view. In the present illustrative embodiment, the blower 18 visible at the lower end of the air supply device 16 comprises an inlet opening (not visible) arranged on the front side of the blower 16. In this connection, it is clear that a free space, from which the blower 18 can draw air, must be present between the upholstery indicated in Figure 1b in the region of the flat surface of the backrest 10 and the inlet opening of the blower 18. A belly-like widening 34 of the air channel 20, inside which - as indicated in dashed lines - the heating element 22 is accommodated, is visible on the pressure side above the blower 18. At the upper end of the air supply device 16, the L-shaped part 36, which comprises the air discharge opening 24, is designed as an element which is telescopically vertically displaceable inside the air channel 20. By virtue of this, the L-shaped part 36 can be height-adjusted together with the head restraint 14. In the illustrative embodiment shown here, both the air channel 20 and the L-shaped part 36 are made of plastic. In this connection, the housing 38 of the blower 18 is connected in one piece to the air channel 20. The air channel 20 and the L-shaped part 36 have a roughly rectangular cross section essentially over their entire length.

In Figures 3a and 3b, the upper part of the air channel 20 with the L-shaped part 36 guided slidably therein is illustrated in a perspective view and in a front view respectively. It can be seen from Figure 3a in particular that the upper part 38 of the L-shaped part 36 extends roughly horizontally. The grid element 32, which is arranged transversely to the flow direction of the airflow flowing through the air channel 20, or rather the upper channel part 38, is arranged close to the air discharge opening 24 inside this roughly

horizontal channel part 38. It is clear that the grid element 32 does not necessarily have to be arranged in the upper channel part 38 of the air channel 20, or rather of the L-shaped part 36. In this connection, it would thus also be conceivable for the grid element 32 to be arranged in the upright part of the air channel 20 between the heating element 22 and the air discharge opening 24. In the present illustrative embodiment, the grid element 32 covers the entire cross section of the air channel 20, or rather of the L-shaped channel part 36. In this case, the plurality of flowthrough openings 40 have a clear cross section or mesh size of preferably roughly 2 to 5 mm. In the present illustrative embodiment, the grid element 20 is made of plastic; other materials would likewise also be possible, in particular a wire mesh or the like.

A homogenization of the airflow generated by the blower 18 and affected by turbulence as it flows through the heating element 20 is achieved by means of the grid element 32 arranged inside the air channel 20, or rather the channel part 38. The grid element 32 moreover has the effect of causing the airflow flowing through to build up slightly. As a result, the airflow arrives at the occupant of the seat at a slightly lower rate than without a grid element 32, which has proved to be especially advantageous with regard to the comfort experience of the occupant. The air build-up at the grid element 32 also causes the airflow to remain slightly longer in the air channel 20 and close to the heating element 22. More heat can consequently be transferred to the airflow by the heating element 22. This consequently results in a higher air outlet temperature in the region of the air discharge opening 24.

A further embodiment of the grid element 32 is illustrated in a diagrammatic front view in Figures 4a

and 4b. While the grid element 32 illustrated in Figures 3a and 3b is essentially designed in one piece, the grid element 32' according to Figures 4a and 4b comprises essentially two grids 42, 44 arranged parallel next to one another which are both horizontally and vertically displaceable in relation to one another. To this end, one of the two grids 42, 44 is arranged in a fixed manner, whereas the other grid 42, 44 is displaceable in its grid plane. The displacement in the horizontal and vertical directions is indicated symbolically in each case with the two arrows. In Figure 4a, the horizontal and vertical grid bars 46, 48 of the front grid 42 overlap the respective horizontal and vertical grid bars 50, 52 of the rear grid 44. In other words, the meshes of the front grid 42 and of the rear grid 44 lie congruently over one another. As a result, the flowthrough openings 54 formed by the grid bars 46-52 of the two grids 42, 44 have a maximum clear cross section which corresponds to the clear cross section or mesh size of each of the grids 42, 44.

Figure 4b illustrates the two grids 42, 44 displaced in relation to one another. In this connection, one grid 44 has been displaced by roughly the length of half the clear cross section of a flowthrough opening 54 in both the horizontal and the vertical direction. It can be seen that, as a result, the plurality of flowthrough openings 54 each have a clear cross section which is only a quarter of the size of that in the arrangement of the two grids 42, 44 shown in Figure 4a. It can also be seen that any clear cross sections of the flowthrough openings 54 or mesh sizes of the grid element 32' can be achieved by displacing one grid 44 in relation to the other grid 42 in both the horizontal and the vertical direction. By virtue of this, it is possible as a result to influence the flowthrough rate

through the grid element 32' and the homogeneity and the temperature of the airflow.